



Class 9 Maths – Ganita Manjari

Chapter 7: The Mathematics of Maybe – Introduction to Probability

★ Important Questions with Answer Key

2026–27 | Based on the new Ganita Manjari textbook

Chapter 7 covers randomness, probability scale, experimental and theoretical probability, statistical probability, sample space, events and tree diagrams.



A. BASIC CONCEPTS

- 1. What is probability?**
- 2. What is randomness?**
- 3. What is a random experiment?**
- 4. What is meant by a random outcome?**
- 5. What is the probability scale?**
- 6. What is the probability of an impossible event?**
- 7. What is the probability of a certain event?**
- 8. What does a probability of 0.5 mean?**
- 9. What does a probability of 0.75 mean?**
- 10. Give an example of an event that is impossible when rolling a standard die.**

11. Give an example of an event that is certain when rolling a standard die.

12. What is subjective probability?

The textbook describes probability as a measurement of the likelihood of an event and introduces the probability scale from **0** to **1**.

B. EXPERIMENTAL PROBABILITY

13. What is experimental probability?

14. Write the formula for experimental probability.

15. A die is rolled 50 times and the number 4 occurs 8 times. Find the experimental probability of getting 4.

16. A die is rolled 12 times and the number 3 occurs 3 times. Find the experimental probability of getting 3.

17. Why can experimental probability be different from theoretical probability?

18. What happens to experimental probability when the number of trials becomes very large?

19. A coin is tossed 20 times. If heads occurs 13 times, find the experimental probability of getting heads.

20. A sample contains 10 red, 8 green, 7 yellow and 5 blue sweets. Find the experimental probability of selecting a green sweet.

The textbook defines experimental probability as the number of times an event occurs divided by the total number of trials.

C. THEORETICAL PROBABILITY

- 21. What is theoretical probability?**
- 22. Write the formula for theoretical probability.**
- 23. Find the probability of getting 4 when a fair die is rolled.**
- 24. Find the probability of getting heads when a fair coin is tossed.**
- 25. A bag contains 5 red balls and 3 blue balls. One ball is selected at random. Find the probability of selecting a red ball.**
- 26. A box contains 10 cards numbered 1 to 10. Find the probability of drawing an even-numbered card.**
- 27. A die is rolled once. Find the probability of getting a number greater than 4.**
- 28. A bag contains 3 red, 2 blue and 1 green ball. Find the probability of selecting a ball that is not red.**

The textbook uses:

$P(E) = \text{Number of favourable outcomes} / \text{Number of possible outcomes}.$

D. SAMPLE SPACE AND EVENTS

- 29. What is a sample space?**
- 30. What is an event?**
- 31. What is the sample space when a coin is tossed once?**
- 32. What is the sample space when a standard die is rolled?**
- 33. Write the sample space when two coins are tossed simultaneously.**
- 34. How many outcomes are there when two coins are tossed?**

35. When a die is rolled, write the event of getting a number greater than 4.
36. When two coins are tossed, write the event of getting at least one head.
37. A die is rolled and a coin is tossed together. Write the sample space.
38. Write the sample space for choosing an integer from -5 to $+5$.
39. A box contains 5 green and 7 red balls. One ball is drawn. Write the sample space in terms of colours.

The textbook states that a sample space must contain **every possible outcome without repetition**, while an event is a subset of the sample space.

E. STATISTICAL PROBABILITY & SAMPLING

40. What is statistical probability?
41. What is sampling?
42. Why is sampling useful?
43. A survey of 50 students shows that 20 like mangoes. Find the probability that a randomly selected student from the sample likes mangoes.
44. If the same sample represents a school of 1500 students, estimate the number of students who may like mangoes.
45. Why can a larger and more representative sample give a better estimate?
46. Distinguish between experimental probability and theoretical probability.

The chapter explains that statistical probability uses collected data and that a representative sample can be used to estimate characteristics of a larger population.

F. TREE DIAGRAMS

47. What is a tree diagram?

48. Why are tree diagrams useful?

49. Draw/list the sample space when a fair coin is tossed twice.

50. Find the probability of getting two heads when a fair coin is tossed twice.

51. Find the probability of getting one head and one tail when two fair coins are tossed.

52. A basket contains 4 red and 5 blue balls. A ball is drawn and not replaced, then another ball is drawn. Find the probability of getting:

- (i) Red then Blue
- (ii) Blue then Blue

53. A child has 2 shirts and 3 types of pants. How many different outfits can be made?

54. Basket A has 1 apple and 2 oranges. Basket B has 1 banana and 1 mango. One fruit is selected from each basket. Find the probability of getting an apple and a banana.

Tree diagrams are introduced as a way to visualise multi-step experiments and list all possible outcomes.

G. HIGH-ORDER THINKING QUESTIONS

55. Explain the difference between equally likely and non-equally likely outcomes.
56. Why are the outcomes of a fair coin toss equally likely?
57. Explain why getting six heads in a row does not make tails more likely on the next toss.
58. What is the Gambler's Fallacy?
59. A fair die has been rolled three times and has shown 6 each time. What is the probability of getting 6 on the next roll? Explain.
60. Why does experimental probability tend to approach theoretical probability as the number of trials increases?

The chapter specifically discusses the **Gambler's Fallacy** and explains that previous independent outcomes do not change the probability of the next outcome.

H. IMPORTANT NUMERICAL QUESTIONS

61. Two coins are tossed. Find the probability of getting at least one head.
62. Three coins are tossed. Find the probability of getting exactly two heads.
63. A spinner has numbers 1 to 8, all equally likely. Find the probability of getting:
- (i) 8
 - (ii) an odd number

- (iii) a number greater than 2
- (iv) a number less than 9
- (v) a multiple of 3

64. The word PEACE is written on five cards. One card is selected at random. Find:

- (i) P, E or C
- (ii) not E

65. Two dice are rolled. Find the probability that their sum is a prime number greater than 5.

66. A bag contains 4 red, 3 green and 2 blue balls. Two balls are drawn without replacement. Find the probability that they are of different colours.

67. Three coins are tossed. Find the probability that the first coin is heads and exactly two heads occur in total.

68. A four-digit number is formed using 1, 2, 3 and 4 without repetition. Find the probability that the number is even.

69. A student guesses answers to 3 MCQs, each having 4 options. Find the probability of getting exactly 2 answers correct.

70. A rectangular region is $2\text{ m} \times 3\text{ m}$ and contains a circle of diameter 1 m. If a point is chosen randomly in the rectangle, find the probability that it falls inside the circle.

These questions closely follow the textbook's end-of-chapter applications, including dice, balls, coins, number formation, MCQs and area-based probability.



ANSWER KEY



Basic Concepts

1. Probability is a measurement of the likelihood of an event.

2. Randomness is a situation in which the exact outcome cannot be predicted in advance, although possible outcomes are known.
 3. A repeatable activity in which the outcome cannot be known with certainty beforehand.
 4. A possible result of a random experiment.
 5. A scale from **0 to 1** showing how likely an event is.
 6. **0**
 7. **1**
 8. The event has an **equal chance** of occurring and not occurring.
 9. There is a **75% chance** of the event occurring.
 10. Getting a number greater than 6.
 11. Getting a number from 1 to 6.
 12. A probability judgement based on personal interpretation or available evidence rather than a formal calculation.
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Experimental Probability

13. Probability calculated using results from actual experiments/trials.
- 14.

Experimental Probability = Number of times event occurs / Total number of trials

15. $8/50 = 4/25 = 0.16$

16. $3/12 = 1/4 = 0.25$

17. Because experimental results vary due to randomness and the number of trials may be limited.

18. It tends to get closer to the theoretical probability.

19. $13/20 = 0.65$

20. $8/30 = 4/15 \approx 0.267$

The textbook notes that with increasing trials, experimental probability tends to approach theoretical probability—the **Law of Large Numbers**.

Theoretical Probability

21. Probability calculated using all possible equally likely outcomes.

22.

$P(E) = \text{Favourable outcomes} / \text{Total possible outcomes}$

23. $1/6$

24. $1/2$

25. $5/8$

26. Even cards = 2, 4, 6, 8, 10 $\rightarrow 5/10 = 1/2$

27. Numbers $>4 = 5, 6 \rightarrow 2/6 = 1/3$

28. Non-red = $3/6 = 1/2$

Sample Space & Events

29. The set/list of all possible outcomes.

30. A single outcome or group of outcomes from a sample space.

31. $S = \{H, T\}$

32. $S = \{1, 2, 3, 4, 5, 6\}$

33. $S = \{HH, HT, TH, TT\}$

34. 4

35. $E = \{5, 6\}$

36. $E = \{HH, HT, TH\}$

37.

$S = \{(1,H), (1,T), (2,H), (2,T), (3,H), (3,T), (4,H), (4,T), (5,H), (5,T), (6,H), (6,T)\}$

38.

$S = \{-5, -4, -3, -2, -1, 0, 1, 2, 3, 4, 5\}$

39. $S = \{\text{Green, Red}\}$

Statistical Probability

40. Probability estimated from collected statistical data.

41. Selecting a smaller group from a larger population to collect information.

42. It allows us to estimate information about a large population without studying every member.

43. $20/50 = 0.4 = 40\%$

44. 40% of 1500 = **600 students**

45. A larger, representative and unbiased sample generally gives a more reliable estimate.

46.

Experimental Probability

Based on actual trials/data

Uses observations

Can vary from trial to trial

Theoretical Probability

Based on equally likely outcomes

Uses reasoning

Gives the expected probability

Tree Diagrams

47. A diagram that shows all possible outcomes of a multi-step experiment.

48. They help visualise and systematically list possible outcomes.

49.

$$S = \{HH, HT, TH, TT\}$$

50.

$$P(HH) = 1/4$$

51.

HT or TH = 2 outcomes

$$P = 2/4 = 1/2$$

52.

(i) Red then Blue:

$$4/9 \times 5/8 = 5/18$$

(ii) Blue then Blue:

$$5/9 \times 4/8 = 5/18$$

53.

$$2 \times 3 = 6 \text{ outfits}$$

54.

$$P(\text{Apple and Banana}) = 1/3 \times 1/2 = 1/6$$

HOTS Answer Key

55. Equally likely outcomes have the same chance of occurring; non-equally likely outcomes have different chances.

56. A fair coin has two equally likely outcomes: H and T.

57. Each toss is independent. Previous tosses do not change the next toss.

58. The mistaken belief that a particular outcome becomes more likely because it has not occurred recently.

59. **1/6.** The previous three results do not affect the next roll.

60. Random fluctuations become relatively smaller as the number of trials increases, so experimental probability tends toward theoretical probability.



Important Numerical Answers

61. Two coins – at least one head

Outcomes = HH, HT, TH, TT

Favourable = HH, HT, TH = 3

Answer = $\frac{3}{4}$

62. Three coins – exactly two heads

Favourable outcomes = HHT, HTH, THH

Answer = $\frac{3}{8}$

63. Spinner 1–8

(i) 8: $\frac{1}{8}$

(ii) Odd: $\frac{4}{8} = \frac{1}{2}$

(iii) Greater than 2: $\frac{6}{8} = \frac{3}{4}$

(iv) Less than 9: $\frac{8}{8} = 1$

(v) Multiple of 3: 3, 6 $\rightarrow \frac{2}{8} = \frac{1}{4}$

64. PEACE

There are 5 cards.

(i) P, E or C: $\frac{4}{5}$

(ii) Not E: $\frac{3}{5}$

65. Two dice – prime sum greater than 5

Prime sums >5 = 7 and 11

Number of favourable outcomes = $6 + 2 = 8$

Total = 36

Answer = $8/36 = 2/9$

66. Different colours

Total ordered outcomes = $9 \times 8 = 72$

Same colour = $4 \times 3 + 3 \times 2 + 2 \times 1 = 20$

Different = $72 - 20 = 52$

Answer = $52/72 = 13/18$

67. First coin heads and exactly two heads

Favourable outcomes = HHT, HTH

Total = 8

Answer = $2/8 = 1/4$

68. Four-digit number using 1, 2, 3, 4

Total numbers = $4! = 24$

Even numbers must end in 2 or 4:

$2 \times 3! = 12$

Answer = $12/24 = 1/2$

69. Exactly 2 correct MCQs

Answer = $9/64$

70. Area probability

Rectangle area = $2 \times 3 = 6 \text{ m}^2$

Circle radius = $1/2 \text{ m}$

Circle area = $\pi(1/2)^2 = \pi/4$

Probability = $(\pi/4)/6$

Answer = $\pi/24 \approx 0.131$

★ TOP 15 QUESTIONS TO MARK AS "IMPORTANT"

For your **Class 9 Chapter 7 Important Questions PDF/page**, I would give these the ★ mark:

1. ★ Define probability and randomness.
2. ★ Explain the probability scale from 0 to 1.
3. ★ Experimental probability formula and numerical.
4. ★ Theoretical probability formula and numerical.
5. ★ Difference between experimental and theoretical probability.
6. ★ Explain the Law of Large Numbers.
7. ★ Define sample space and event.
8. ★ Write sample spaces for coins and dice.
9. ★ Probability of at least one head.
10. ★ Probability involving three coins.
11. ★ Tree diagram problems.
12. ★ Probability using data/sampling.
13. ★ Gambler's Fallacy.
14. ★ Two-dice probability problems.
15. ★ Probability involving drawing balls without replacement.

📌 Formula Box

Experimental Probability

= Number of times event occurs / Total number of trials

Theoretical Probability

= Number of favourable outcomes / Number of possible outcomes

Probability Range

$$0 \leq P(E) \leq 1$$

Impossible Event: $P(E) = 0$

Certain Event: $P(E) = 1$

Even Chance: $P(E) = 1/2$

These are the key formulas and limits given in the chapter summary.